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a city house, where the space between any two houses is not more than eight feet in width, so that it receives very little direct sunlight. Below the thin coating of sod the substratum is composed mostly of debris from the building operations, such as pieces of tin, bricks, slate and pebbles. For two years an attempt was made to grow grass on this strip, but without success.

In 1903, a number of wild plants including diminutive trees, small shrubs and perennial herbaceous plants, in all about a hundred species were added. The plants have been distributed so as to give the best ornamental effect. At intervals of several feet through the middle of the strip the small trees and shrubs and larger herbaceous perennials, as blue cohosh and black snakeroot, are planted. Between these are the smaller plants, the more attractive and those producing the most flowers being near the front, as violets, wild geranium, etc. A few rocks are placed near some of the ferns, columbines, and other plants which seem to prefer a rocky situation. There is a procession of flowers from early spring when the bloodroot, hepatics and spring beauties make their appearance, until fall when the asters and other plants are in bloom. Not only is there a succession of flowers, but the foliage is also of interest and beauty. The ferns and bloodroot are specially interesting when the leaves are unfolding, and in the late fall the yellow leaves of the spice bush and tulip poplar, the red leaves of the maple and dogwood, and also the red berries of the jack-in-the-pulpit and Solomon's seal, the blue berries of the blue cohosh, are very attractive at a time when the flowering season has gone by.

The desirability of preserving individual trees and strips of woodland in the suburbs of cities was considered, and the opinion expressed that if a universal sentiment were created in favor of this, the means would be forthcoming for the purchase and protection of trees and wooded lots. In this connection the statement was made 'that there is no item of taxation which the people of London

more cheerfully pay than those for the maintenance of small parks.'

C. STUART GAGER,
Secretary.

DISCUSSION AND CORRESPONDENCE.

C. S. RAFINESQUE ON EVOLUTION.

RECENT discussions in SCIENCE relating to evolution, its nature and terminology, call to mind a very remarkable letter written in 1832 by Rafinesque and published by him in the 'fifth number for the spring of 1833' of his *Atlantic Journal* and 'Friend of Knowledge.'¹ This letter, which in many respects reads so curiously modern, seems to deserve reproduction here. The first part of it, it is true, has been quoted in Call's 'Life and Writings of Rafinesque,'² but the last half of the letter is not the least interesting part. Asa Gray³ also quotes a sentence of it, and Darwin⁴ refers to two sentences in Rafinesque's 'New Flora of North America,'⁵ which show indication of Rafinesque being an evolutionist. The reproduction here is not so much for the purpose of calling attention to the latter fact, but rather to emphasize the essentially modern phraseology employed.

Copied *verbatim, literatim et punctuatim* it is as follows:

124. Principles of the Philosophy of new Genera and new species of Plants and Animals. *Extract of a letter to Dr. J. Torrey of New York dated 1st Dec. 1832.* . . . I shall soon come out with my avowed principles about G[enera] and Sp[ecies] partly announced 1814 in my principles of Somiology, and which my experience and researches ever since have confirmed. The truth is that *Species and perhaps Genera also, are forming in organized beings by gradual deviations of shapes, forms and [p. 164] organs, taking place in the lapse of time. There is a tendency to deviations and mutations through plants and animals of gradual steps at remote irregular periods. This is a part of the great universal law of PERPETUAL MUTABILITY in every thing.*

¹ Vol. I., Philadelphia, No. 5, pp. 163-164.

² From 'Herbarium Rafinesquianum,' 1833, pp. 11-15.

³ Silliman's *Amer. Jour. Sci. Art.*, XL., 1841, p. 239.

⁴ 'Orig. Species,' 4th ed., 1866, p. xvi.

⁵ 1836, pp. 6 and 18.

Thus it is needless to dispute and differ about new G. Sp. and varieties. Every variety is a deviation which becomes a Sp. as soon as it is permanent by reproduction. Deviations in essential organs may thus gradually become N. G. Yet every deviation in form ought to have a peculiar name, it is better to have only a generic and specific name for it than 4 when deemed a variety. It is not impossible to ascertain the primitive Sp. that have produced all the actual; many means exist to ascertain it: history, locality, abundance, etc. This view of the subject will settle botany and zoology in a new way and greatly simplify those sciences. The races, breeds or varieties of men, monkeys, dogs, roses, apples, wheat . . . and almost every other genus, may be reduced to one or a few primitive Sp. yet admit of several actual Sp. names may and will multiply as they do in geography and history by time and changes, but they will be reducible to a better classification by a kind of genealogical order or tables.

My last work on Botany if I live and after publishing all my N. Sp. will be on this, and the reduction of our Flora from 8000 to 1200 or 1500 primitive Sp. with genealogical tables of the gradual deviations having formed one actual Sp. If I can not perform this, give me credit for it, and do it yourself upon the plan that I trace.

C. S. R.

As we know, Rafinesque never worked out the plan he thus had traced, nor was his pathetic appeal to be given credit for it ever entertained. Call (*l. c.*) regards Rafinesque as a Lamarckian rather than a Darwinian, but we are now, perhaps, warranted to ask whether he was not really a de Vriesian. His curious distinction between 'primitive species' and 'actual species' is more pertinent in this connection than his use of the word 'mutation,' though the coincidence is interesting enough. His 'genealogical tables' also clearly foreshadow the 'phylogenetic tree,' and altogether the whole letter reads singularly prophetic.

I am under obligation to Dr. Theodore Gill for the references to Asa Gray and Darwin.

LEONHARD STEJNEGER.

U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.,
May 3, 1906.

*In another article in the same journal, p. 173, he says that 'almost every *genuine* or *primitive* species will be found to constitute a peculiar genus.'

THE INFLUENCE OF THE PLASTICITY OF ORGANISMS UPON EVOLUTION.

IN their discussions of 'organic selection,' Morgan, Osborn, Baldwin and others have urged the importance of the plastic response of the individual members of a species in guiding the course of its evolution. I do not see that one can doubt the reality of this influence, but as to the extent and exact character of the influence there seems room for discussion.

In the case of a species whose members are highly plastic, responding promptly and extensively, in certain particular ways, to the modifying influences of the environment, those individuals in which similar adaptive characters later appear as congenital variations will have but slight advantage over the ontogenetically adapted, and selection must be comparatively ineffective. The only advantage to the congenitally adapted will be in the fact that in their early life they have to pass through no period of education, and if the ontogenetic adaptation of other individuals be prompt and sufficient, it seems as if the latter would be at comparatively slight disadvantage. A high degree of plasticity hinders evolution by selection, of characters similar to those acquired by plastic response to the environmental influences.

In the case of a species whose members are but slightly plastic, or are slow in their adaptive response, the congenitally adaptive may have a considerable initial advantage. It is doubtful, however, if slight plastic response will be highly effective in securing the survival of the individuals until the species could become congenitally modified in a similar way.

So far, then, as a single set of characters are concerned, we may say that a high degree of plasticity will probably retard evolution as much or more than it will guide, while slight plasticity, allowing only imperfect ontogenetic adaptation, may be ineffective in preserving the species. The guiding effect of ontogenetic responses upon the course of evolution can hardly be both very extensive and intimate (exact).